

One thing we have learnt this week – solar fuels

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Bill Gates recently visited a lab developing solar fuels at Caltech. Readers of this blog will know that I'm not a great fan of the so called hydrogen economy. The problem with hydrogen is that it has a very low energy density compared to other fuels. Another drawback is that it will require a whole new infrastructure. Add some carbon atoms to the hydrogen and the energy density increases dramatically. There are long standing ways of doing this one way is to use the Fischer-Tropsch method. In this an alkane carbon chain of any length can be built from carbon and hydrogen by tweaking the reaction conditions. Whilst this method may have some applications in making chemical feedstocks in a post oil world the energy return is very poor since the reaction only occurs at very high temperatures (400-500°C). What if you could make such fuels at low temperatures using light as the energy source to split water to hydrogen and oxygen and then combine the hydrogen and carbon from carbon dioxide at low temperatures. Sort of like photosynthesis, in fact some groups are trying to use this as a basis for making solar fuels. Algae is one possibility people have been working on. If the problems with this could be cracked then many of the drawbacks of the renewable economy. There would be a source of renewable transport fuel, a way of tying up carbon from the atmosphere and even a means of storing renewable energy inter-seasonally. However as we outlined in our [book](#) there is one major problem with all this. That is land area. If you considered using every plant as fuel on the planet then its unlikely there would be enough for our energy needs. The land area to make even an appreciable dent in the liquid fuel replacement problem would be huge. Neil

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